To: University of Miami Independent System for Peer Reviews

From: Dr. Rudy M. Ortiz, Department of Biology, University of California, Santa Cruz, Santa Cruz, CA 95064

RE: Final Report on the IDCPA Program

Executive Summary

For over five decades, the tuna industry has used the association between tuna and dolphins to fish in the eastern tropical Pacific (ETP). Three stocks of dolphins, eastern spinner *(Stenella longirostris orientalis*), northeastern offshore spotted *(Stenella attenuata attenuat*a), and coastal spotted *(Stenella attenuata graffman*i), were depleted by high mortality associated with tuna purse-seine nets, with approximately five million dolphins killed between 1959 and 1972 (Wade 1995). While changes in the fishery during the last few decades have greatly reduced the observed mortality of dolphins, there exists little evidence of recovery. As a result, the International Dolphin Conservation Program Act (IDCPA) required that studies of population abundance and stress be conducted by the National Marine Fisheries Service (NMFS) to determine whether the intentional deployment on, or encirclement of, dolphins by purse-seine nets is having a *significant adverse impact* on any depleted dolphin stock. The IDCPA program review consisted of four major components: 1) Abundance Review, 2) Stress Review, 3) Ecosystem Review, and 4) Assessment Model Review. The topic of this science review focuses on the results of the Stress Review. Despite the logistical constraints of such a scientific endeavor, the data obtained from the stress studies undoubtedly suggest at least some of the animals captured experienced a typical, mammalian neuroendocrine stress response and associated muscular deterioration. However, a number of recommendations are provided to quantify these statements and to provide supporting data in other cases.

Background

One of the major components of the stress review was an evaluation of data from the Chase Encirclement Stress Studies (CHESS), a suite of research projects initiated and conducted between August and October 2001, and directed toward the central question of *whether repeated chase and encirclement as part of tuna fishing operations can have a negative impact on the health, reproduction and survival of spotted and spinner dolphins, and consequently affect the ability of this population to recover from excessive fishery-related mortalities in past decades.* CHESS consisted of a number of research topics including endocrinology, immunology, pathology, thermoregulatory physiology, and behavior. The following primary results were obtained from the various studies. The relatively elevated concentrations of adrenocorticotropin (ACTH), cortisol, and catecholamines would suggest an acute neuroendocrine stress response. While studies of the immune system revealed some changes in lymphocyte subsets, there was, overall, no change in immune function. Post-mortem evaluation of lymphoid organ morphology indicated that the immune system was not compromised. Thermal studies also revealed some statistically significant correlations, but the overall result was that core body temperature was maintained regardless of the chase duration. Necropsies reveal the presence of benign cardiomyopathy with unknown functional consequences. Scarring in cardiac tissue suggests exposure to previous sublethal damage. During the encirclement process, two of the approximately 1500 animals encircled (0.13 %) died, with the cause of death attributed to

"sympathetic storm" characterized by the pronounced release of catecholamines. During backdown dolphins begin to congregate at the release end of the net indicating that these animals are familiar with the operation and have been habituated to it.

Summary of the conclusions previously drawn from the stress results were as follows:

1) The likelihood that encircled dolphins exhibit an acute neuroendocrine response typical of exercise- or psychological-induced stress is not surprising, especially in the present series of studies since the animals were chased before being handled for various manipulations. The neuroendocrine response to stress has been well documented in mammals (Axelrod and Reisine 1984), and a substantial literature exists on circulating indicators of stress in cetaceans (for review, see St. Aubin and Dierauf 2001). The relatively elevated concentrations of ACTH, catecholamines, and cortisol suggest that some of these dolphins exhibited a typical neuroendocrine response to chase and encirclement. The most intriguing result may be the persistently elevated concentrations of ACTH, since this peptide has a relatively short biological half-life in circulation (18 min; Liotta et al. 1978) suggesting that stimulation of the hypothalamus was chronic in some of the animals in the present conditions. However, hormonal responses to exercise- (Dressendorfer and Wade 1991) and restraint-induced stress (Glavin et al. 1994) are well defined with some obvious overlap between the two in the present study. Results from hormonal data make it virtually impossible to discern what portion of the observed endocrine response was associated to the chase (or exercise) and what portion was attributed to the restraint of the animals during blood sampling. These variables necessitate obtaining reliable baseline data, under "non-stressed" conditions.
2) The limitations of working in the middle of the ocean and the number of logistical constraints associated with this operation make it difficult to derive the required science to properly address the underling question of whether or not repeated chase and encirclement as part of tuna fishing operations have a negative impact on the health, reproduction and survival of spotted and spinner dolphins, and consequently affect the ability of this population to recover from excessive fishery-related mortalities in past decades. Again because of such limitations, the availability of baseline data obtained from properly controlled studies, most likely in a captive setting, are required to sufficiently address the hormonal data.
3) The behavioral data suggests that these animals may be habituated to the chase and encirclement procedures and the necropsy data suggests that these dolphins have been previously exposed to this stress. Because many of the animals have undoubtedly been previously encircled and most likely habituated to these procedures, as suggested by their behavior during backdown, the possibility exists that the large variability in many of these measurements suggests that many of these animals are conditioned to these procedures while others are not. This possibility is consistent with our previous suggestion that in wild bottlenose dolphins, most animals were less susceptible to a neuroendocrine stress response (Ortiz and Worthy 2000).

4) In humans, cortisol can acutely (hrs) suppress circulating testosterone (T) (Cumming et al. 1983) suggesting that physiological stress can negatively impact reproduction.

5) Mean concentrations of aspartate aminotransferase (AST), creatine kinase (CK), and lactate dehydrogenase (LDH), indicators of skeletal muscle necrosis due to capture myopathy, were considered elevated relative to those values reported for several other species of odontocetes (Bossart et al. 2001), but were similar to those values reported for net-impounded harbor porpoises (Koopman et al. 1995). Nonetheless, these values reported for cetaceans likely represent subclinical catabolism of skeletal muscle secondary to capture (Bossart et al. 2001) and pale in comparison to values observed in clinical capture myopathy, which are typically in the thousands of units per liter ($U\ L^{-1}$) (ie, Hartup et al. 1999). If anything, a small number of animals exhibited subclinical capture myopathy, but overall, this condition does not appear to be a serious consequence of the capture.

Review Activities

The duties for the final IDCPA report consisted of reading the draft IDCPA science report, producing a written evaluation of the report, discussing any comments from the report with relevant NMFS staff from the La Jolla Laboratory via telephone, and incorporating these comments into a revised final report. As a previous reviewer of the CHESS project, my goal was to objectively evaluate the interpretation of the science as presented in written manuscript form in the IDCPA science report. Because my academic background and professional training are in endocrinology, my review focused on the hormonal data and its use in the evaluation of stress.

Summary of Findings and Specific Recommendations

The section reporting on stress and other fishery effects is strengthened by the fact that it recognizes the shortcomings and limitations of evaluating the results in the absence of controls and baseline data. This is clearly stated in paragraph one on page 22, "…the available data are insufficient to clearly resolve the matter of whether or not the fishery and its activities are causing lethal stress…". In paragraph two, page two, I have no doubt the possibility exists that the stress induced by chase and encirclement can compromise the health of "at least some of the dolphins involved"; however, I suggest quantifying this statement. For example, if a healthy animal is defined as one in which its blood chemistry values and indices of immunocompetence are "normal", and stress is defined as elevated catecholamines, ACTH, and cortisol, then what percentage of the animals that were blood sampled and that can be considered "healthy" exhibited indices of stress? Given that blood was collected from approximately 70 animals in the CHESS cruises, to state that "at least some of the dolphins" may be compromised is too vague.

I have three points of contention, which may be remedied through inclusion of supporting data.

1. In the last sentence at the top of page 23, I would disagree with the speculation that purse-seining activities may have a "negative impact on some individuals, and consequently their populations". How many is "some"? This goes back to my previous comment about qualifying vague terms. I don't believe there is sufficient data to substantiate a claim that small effects on

"some" individuals are affecting their entire population. Not being a population biologist, I can think of a number of populations in which individuals are continually affected without this producing a population level effect. I would agree with the claim if there were sufficient data from cow/calf separations to state that X number of separations leads to the death of Y number of calves following a purse-seining activity. However, as the report claims, "unobserved mortality warrants further study." To state that individual mortality is impacting the population, the report should cite a case in the literature in which this has been observed.

2. Along the same lines as stated above, on page 24 of the report, the stress section concludes that "….at current dolphin abundances and levels of fishing effort, a lack of recovery could be caused by the loss of only a few additional dolphins per set." I don't believe the data presented or interpreted in the final report substantiates this claim. In fact, in the penultimate paragraph of this section on page 24 (prior to the concluding paragraph), the numbers could be used to argue otherwise. Individual spotted dolphins are chased on average of once a month and only caught every 3 or 4 months, while individual spinners are chased every 3 or 4 months and are caught only once a year. Given that such a small percentage of individuals actually exhibited "elevated" stress hormones and indices of muscle necrosis, I would conclude that these animals are quite resistant to these procedures. If the report concludes that losing only a "few" additional dolphins per set is causing the lack of recovery, then these calculations should be presented in a simplistic and obvious manner in the report. Again "a few" should be quantified.

3. Lastly, the first paragraph on page 23, article (c), "extremely high levels of stress hormones associated with acute, fatal heart damage in the fishery-killed dolphins." should be reworded. As is, this claim implies that the acute, fatal heart damage observed in the fishery-killed dolphins was caused by "extremely" high stress hormones, which is not the case. This statement also implies all fishery-killed dolphins succumbed to acute, fatal heart damage, which again was not the case. Data from the necropsy report suggest that the observed cases of heart lesions may have been the cause of death. A catecholaminergic storm ("extremely high stress hormones") could be a potential cause of such heart damage, but no cause-and-effect relationship could be ascertained from the necropsy data. I suggest rewording along the lines of "(c) acute, fatal heart damage in some (where "some" will need to quantified) fishery-killed dolphins, which could be related to elevated catecholamines". A sympathetic or catecholaminergic storm does not require elevated ACTH and/or cortisol (other stress hormones), therefore the phrase "extremely high stress hormones" is vague and less accurate.

Aside from the recommendations and suggestions above, I suggest two additional points for clarification in the stress report. St. Aubin (2002) provides a well--organized summary on the interactions of stress and gender, reproduction, exertion (exercise), and the immune system, among other factors. Two important points discussed by Dr. St. Aubin in particular should be incorporated in the stress section. First, the distinction between exercise/exertion-induced stress and restraint/psychological-induced stress should be made. Because the methods used to capture the dolphins to obtain the blood samples required both variables of stress (chase = exertion/exercise and encirclement = restraint/psychological), the results cannot distinguish between the two, thus necessitating baseline data. Secondly, gender-related differences in the response to stress and the effects of stress on reproduction and hormones related to reproduction are well reviewed in the literature, as highlighted in St. Aubin (2002). The glaring omission of such data on any marine mammal in the literature is by itself disconcerting, but the fact that stress compounds reproduction warrants mention, especially in the present situation in which the

populations of these dolphins have not recovered. The recovery of the dolphin populations is inherently related to the reproductive success of these animals, which may be impeded by stress.

In conclusion, the report recognizes the limitations of the data collected. However, claims that individual-level effects can or will hinder population growth must be qualified with supporting data or relevant scientific citations. Vague terms such as "few" and "some" should be quantified. The claimed association between extremely high hormones and acute, fatal heart damage should be reworded to dissociate the two, since a cause-and-effect relationship cannot be ascertained from the existing data. The recommendations that mention of the relationships between stress and exercise and stress and reproduction in the report were provided.

Revisions following discussions with NMFS scientists

Following discussion with NMFS scientists, most of my aforementioned comments were properly addressed for clarity. Much of the perceived vagueness of the report was explained to be intentional, as befits a primarily non-technical audience. With this understanding, the use of terms such as "few" and "some" may be appropriate. However, the report would still be strengthened with quantification of these terms.. Unfortunately, no assurances were made that quantification of these terms was possible. In regards to my criticisms of individual effects eliciting population level effects, an understanding was reached that simplified calculations could be added to substantiate such claims. It was agreed that the statement regarding extremely high stress hormone levels and acute, fatal heart damage would be reworded so as not to give the impression that a cause-and-effect relationship existed. Lastly, Dr. Martineau made an important recommendation that the sample size of 300 animals for the necropsy program could easily be attained by obtaining animals killed by various tuna fleets since current mortality is approximately 6,000 animals per year. This is a recommendation that I, too, strongly support; however, NMFS scientists noted the lack of cooperation between the commercial sector and government agencies to allow for obtaining more fishery-killed dolphins. If so, I strongly recommend that greater efforts be made by the responsible parties to improve the collaboration between the commercial sector and the appropriate government agencies in order to obtain as many carcasses as possible on an annual basis. The loss of these animals to science is disappointing, especially since much needed research could be accomplished through a necropsy program.

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porpoises *(Phocoena phocoena)* (L.). Mar Mamm Sci 11:123-135

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St. Aubin, D.J. and L.A. Dierauf. 2001. Stress in Marine Mammals. Pages 253-269 *in* L. A. Dierauf and F.M.D. Gulland eds. Handbook of Marine Mammal Medicine: Health, Disease and Rehabilitation. Vol. 2. CRC Press, Boca Raton, FL.

St Aubin, D. J. 2002. Further assessment of the potential for fishery-induced stress on dolphins in the eastern tropical Pacific. Administrative Report LJ-02-23C. NMFS, La Jolla, CA.

Wade, P.R. 1995. Revised estimates of dolphin kill in the eastern tropical Pacific, 1959-1972. Fish Bull 93:345-354

Appendix 1: Bibliography of IDCPA Science Report

Barham, E., W. Taguchi, and S. Reilly. 1977. Porpoise rescue methods in the yellowfin purse seine fishery and the importance of Medina panel mesh size. Marine Fisheries Review May 1977:1-10.

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Edwards, E. 1989. Using tuna-vessel observer data to detect trends in abundance of dolphin populations: history and research to date (1988). SWFSC Admin. Report No. LJ-122-89.123p.

Escorza-Trevino, S., A. Lang and A. E. Dizon. 2002. Genetic differentiation and intraspecific structure of eastern tropical Pacific spotted dolphins, *Stenella attenuat*a, revealved by mitochondrial and microsatellite DNA analyses. SWFSC Admin. Report No. LJ-02-38, 19pp.

Forcada, J. 2002. Multivariate methods for size_dependent detection in conventional line transect sampling. SWFSC Admin. Report No. LJ-02-07.. 31 p.

Gerrodette, T., and J. Forcada. 2002. Estimates of abundance of northeastern offshore spotted, coastal spotted, and eastern spinner dolphins in the eastern tropical pacific ocean. SWFSC Admin. Report No. LJ-02-06. 43p.

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Olson, P., and T. Gerrodette. 1999. Report of the meeting to review preliminary estimates of eastern tropical Pacific dolphin abundance in 1998 - January 21, 1999. SWFSC Admin. Rep., La Jolla, LJ-99-03, 28p.

Wade, P.R. 1994. Abundance and population dynamics of two eastern Pacific dolphins, *Stenella attenuata* and *Stenella longirostris orientali*s. Ph.D. dissertation. University of California (San Diego).

Wade, P. R. 1993a. Assessment of the northeastern stock of offshore spotted dolphin *(Stenella attenuat*a). Administrative Report No. LJ-93-18, NMFS, Southwest Fisheries Science Center, 8604 La Jolla Shores Drive, La Jolla, CA 92037. 21pp.

Wade, P. R. 1993b. Estimation of historical population size of the eastern spinner dolphin *(Stenella longirostris orientali*s). Fishery Bulletin 91:775-787.

Appendix 2: STATEMENT OF WORK

Consulting Agreement Between The University of Miami and Dr. Rudy M. Ortiz

Background

The tuna purse seine fishery has used the association between tuna and dolphins to fish in the eastern tropical Pacific Ocean (ETP) for over five decades. Three stocks of dolphins were depleted by high historical levels of dolphin mortality in tuna purse seine nets, with an estimated 4.9 million dolphins killed during the fourteen-year period 1959-1972. After passage of the Marine Mammal Protection Act (MMPA) in 1972 and the increased use of fishing equipment and procedures designed to prevent dolphin deaths, mortality decreased during the late 1970s, 1980s, and 1990s to levels that are generally considered biologically insignificant.

While changes in the fishery have dramatically reduced the observed mortality of dolphins, the MMPA, as amended by the International Dolphin Conservation Program Act (IDCPA), requires that the National Marine Fisheries Service (NMFS) conduct research consisting of three years of population abundance surveys and stress studies to form the basis of a determination by the Secretary of Commerce regarding whether the "intentional deployment on, or encirclement of, dolphins by purse-seine nets is having a significant adverse impact on any depleted dolphin stock". The Secretary must make a final finding in this regard by December 31, 2002. It should be noted that this issue is controversial and particularly relevant to persons involved with NMFS, the US and non-US tuna industry, and environmental groups.

The topic of this review is the IDCPA Science Report that will be presented to the Secretary of Commerce, along with information obtained under the IDCP, and other relevant information to form the basis of the Secretary's final finding. The IDCPA Science Report is comprised of the results of all research activities required under section 304(a) of the MMPA, as amended by the IDCPA. Each major component of this report has been separately considered in a series of independent peer reviews conducted by the Center for Independent Experts (CIE). These consist of: the Abundance Review (October 15-17, 2001) the Stress Review (February 4-6, 2002), the Ecosystem Review (March 6-8, 2002), and the Assessment Model Review (April 3-5, 2002).

Abundance Review

The topic of this review was the abundance of several species of tropical pelagic dolphins that associate with tuna and are killed in the ETP purse seine tuna fishery. Estimates of dolphin abundance based on cruises carried out in 1998-2000 form a central part of these studies. The main task of the consultant was to review the methods used to estimate abundance from line-transect data, including covariate detection models. The fact that these dolphins occur in a wide range of school sizes presents unique problems for the estimation of expected group size, so considerable effort has been devoted to this analysis. Documents supplied to the reviewers included draft manuscripts describing the covariate analysis, simulations to test the performance of several estimators, calibration of school size estimates, and assignment of partially identified

sightings. Background papers included previous relevant publications and reports. The raw data and software used in the analysis were also made available.

Stress Review

The stress studies mandated in the IDCPA include: 1) a review of relevant stress-related research and a three-year series of necropsy samples from dolphins obtained by commercial vessels; 2) a one-year review of relevant historical demographic and biological data related to the dolphins and dolphin stocks; and 3) an experiment involving the repeated chasing and capturing of dolphins by means of intentional encirclement. This review included a suite of studies subsumed under this general topic, and a brief description of these studies follows.

The necropsy program analyzed samples from about 50 dolphins killed incidentally during fishing operations. Historical biological samples and data were analyzed to investigate stress-activated-proteins (SAPs) in the skin in dolphins killed in the fishery and live-sampled via biopsy. Historical data were also examined to assess separation of cows and calves during fishing operations. Chase Encirclement Stress Studies were conducted during a two-month research cruise aboard the NOAA ship McArthur in the ETP. During this project, the team worked in cooperation with a chartered tuna purse seine vessel to study potential effects of chase and encirclement on dolphins involved in tuna purse seine operations. Dolphins groups were found to be much more dynamic than previously recognized, making it extremely difficult to recapture groups of dolphins over the course of several days to weeks, as planned.

In the end, nine different dolphins were tracked for 1-5 days during the course of the study, including two animals outfitted with a thermal tag that recorded heat flux, temperature, and dive data. Individual radio-tagged dolphins and 1-4 associated roto-tagged dolphins were recaptured on several occasions spanning shorter periods of 1-3 days. Six satellite tags were deployed to record movement and dive data on dolphins that were not recaptured. Biological data and samples were collected from as many captured dolphins as possible, and include: 70 blood samples, of which 18 were from repeat captures of marked individuals; 283 skin samples, of which 17 were from previously captured and sampled animals; 449 analyzable thermal images; 52 core temperatures; and 95hrs of heat flux data. Females with calves were noted on several recapture occasions, and one known calf was skin sampled during an initial and subsequent capture.

Ecosystem Review

To complement the three-year abundance studies, population assessments were made for the following years: 1986, 1987, 1988, 1989, 1990, 1998, 1999, and 2000 with a primary goal being to determine if populations that were historically reduced in size are increasing over time. Should the assessments indicate no increase (lack of recovery), three broad categories of factors could be the cause: a) effects from the fishery; b) effects from the ecosystem; c) an interaction between the proceeding two factors. This need to attribute causality for a potential lack of recovery serves as the primary justification for ecosystem studies. By investigating the physical and biological variability of the ecosystem of which the dolphin stocks are a part, we establish a context which can be used to better interpret trends in dolphin abundance. A lack of recovery

that is not mirrored by some other change in the ecosystem would largely eliminate an ecosystem hypothesis, leaving fishery effects as the most likely cause.

This review included a suite of studies subsumed under the general topic of ecosystem research in the ETP. The basic approach was to compare ecosystem parameters over time with a primary goal being to look for indications of a potential ecosystem shift. The power of these ecosystem studies increased with the number of environmental variables, taxa, and trophic levels included, and with the time period spanned (although most ecosystem data available for these investigations were collected concurrently with dolphin assessment data aboard NOAA research vessels and are restricted to the late 1980s and late 1990s).

The general components of the ecosystem research included: 1) physical and biological oceanography: sea surface temperature, thermocline characteristics, phytoplankton and zooplankton distribution and relative abundance; 2) larval fishes: distribution and relative abundance; 3) flying fishes: distribution, relative abundance, and habitat relationships; 4) seabirds: distribution, absolute abundance, and habitat relationships; and 5) cetaceans: distribution, absolute abundance, and habitat relationships.

Assessment Model Review

As indicated above, NMFS was charged with essentially determining whether or not the depleted dolphin stocks are recovering, and if so, at what rate and at what level of certainty. The topic of this review was the overall framework that will be to estimate the growth rate of two dolphin populations of interest, the northeastern offshore spotted dolphin and the eastern spinner dolphin, using growth rates estimated by fitting a population model to the three-year and other available estimates of abundance. For this review, estimates from research vessel surveys using line transect methods are available for three periods: 1979-83 (four estimates), 1986-90 (five estimates), and 1998-2000 (three estimates), for a total of twelve estimates over twenty-one years. Reviewers were also asked to evaluate the inclusion or exclusion of a set of fishery-dependent indices of abundance, resulting from data collected by tuna vessel observers. Two types of population growth rate will be estimated: (1) exponential rate of change from 1979-2000 and (2) intrinsic rate of increase under the assumption of a density-dependent model where pre-exploitation population size in 1958 is considered carrying-capacity. Both an aggregated population model and an age-structured model will be used. Bayesian statistics, using a numerical integration method, were used to estimate a probability distribution for the population growth rate.

Specific Reviewer Responsibilities

For the final IDCPA Science Program Review, expertise is needed to review all components of the research described above, specifically with respect to NMFS' incorporation of comments previously received from the topical reviews also described above. Reviewers will be provided with the draft IDCPA Science Report, as well as comments received as a result of the CIE reviews and explanations of how/why such comments were or were not incorporated into the report.

The reviewer's duties shall not exceed a maximum total of 11 days, including:

- 2-3 days to read the draft IDCPA Science Report (to be provided to the reviewers by no later than August 2, 2002);
- 2-3 days to produce a written report of the reviewer's comments and recommendations on the draft report;
- 1-2 days to discuss via telephone, on August 15-16, 2002, with relevant NMFS staff from the NMFS La Jolla Laboratory, the incorporation of comments and any related questions; and
- 2-3 days to revise the written report based on those discussions.

It is expected that each reviewer will have participated in the earlier CIE reviews of IDCPA research described above and will not require general presentations of research results, but will focus on addressing comments and recommendations included in the reviewers' reports in his/her topic area. Reviewers should particularly consider whether the responses to the original review comments are sufficient and acceptable, in a manner similar to the role filled by a journal editor when considering manuscripts revised in response to referees' comments.

Each reviewer's report shall reflect the reviewer's area of expertise; therefore, no consensus opinion (or report) will be required. Specific tasks and timings are itemized below:

1. Read and become familiar with the draft IDCPA Science Report provided in advance;

2. No later than August 13, 200, submit a written report of findings, analysis, and conclusion in the individual reviewer's topic area to NMFS;

3. Discuss relevant documents with scientists from the NMFS La Jolla Laboratory via telephone on August 15-16, 2002, to facilitate proper incorporation of reviewers' comments;

4. No later than August 23, 2002, submit a revised written report of findings, analysis, and conclusions based on discussions held with relevant NMFS staff from the NMFS La Jolla Laboratory. The written report[1] (see Annex I) should be addressed to the "University of Miami Independent System for Peer Review," and sent to Dr. David Die, via email to ddie@rsmas.miami.edu, and to Mr. Manoj Shivlani, via email to mshivlani@rsmas.miami.edu.

Signed_____ Date_____

[1] The written report will undergo an internal CIE review before it is considered final. After completion, the CIE will create a PDF version of the written report that will be submitted to NMFS and the consultant.

ANNEX I: REPORT GENERATION AND PROCEDURAL ITEMS

1. The report should be prefaced with an executive summary of comments and/or recommendations.

2. The main body of the report should consist of a background, description of review activities, summary of comments, and conclusions/recommendations.

3. The report should also include as separate appendices the bibliography of materials provided by the Center for Independent Experts and a copy of the statement of work.

4. Individuals shall be provided with an electronic version of a bibliography of background materials sent to all reviewers. Other material provided directly by the center must be added to the bibliography that can be returned as an appendix to the final report.

Appendix 3: Bibliography of Background Materials

Previous ETP dolphin stress studies reviews

Bossart, G. D. 2002. Center for Independent Experts Dolphin Stress Review. Review paper prepared for the University of Miami Center of Independent Experts, 31 pp.

De Guise, S. 2002. Tuna fisheries-associated stress in dolphin: A review of findings from different studies. Review paper prepared for the University of Miami Center of Independent Experts, 26 pp.

Mann, J. 2002. Review of ETP Literature on CHESS. Review paper prepared for the University of Miami Center of Independent Experts, 17 pp.

Martineau, D. 2002. Review of the 2001 Chase Encirclement Stress Studies on dolphins targeted in Eastern Tropical Pacific Ocean purse seine operations. Review paper prepared for the University of Miami Center of Independent Experts, 38 pp.

Ortiz, R. M. 2002. Report on the Findings of the Chase Encirclement Stress Studies (CHESS). Review paper prepared for the University of Miami Center of Independent Experts, 37 pp.

IDCPA research program:

SWFSC. 2002. Report of the overall IDCPA research program and results.

Abundance estimates for depleted dolphin stocks

Brandon, J., T. Gerrodette, W. Perryman and K. Cramer. 2002. Responsive movements and g(0) for target species of research vessel surveys in the eastern tropical Pacific Ocean.

Forcada, J. 2002. Multivariate methods for size-dependent detection in conventional line transect sampling.

Gerrodette, T. and J. Forcada. 2002. Estimates of abundance of northeastern offshore spotted, coastal spotted, and eastern spinner dolphins in the eastern tropical Pacific Ocean.

Gerrodette, T., W. Perryman and J. Barlow. 2002. Calibrating group size estimates of dolphins in the eastern tropical Pacific Ocean.

Kinzey , D., T. Gerrodette and D. Fink. 2002. Accuracy and precision of perpendicular distance measurements in shipboard line-transect sighting surveys.

Ecosystem studies

Ballance, L. T., P. C. Fiedler, T. Gerrodette, R. L. Pitman and S. B. Reilly. 2002. An overview of eastern tropical Pacific ecosystems studies within the context of International Dolphin Conservation Program Act research.

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Appendix 4: List of Appendices from the IDCPA Report

Appendix 1: Scientific reports and papers produced under the IDCPA research program

Appendix 2: List of Acronyms

Appendix 3: Consultations held with the MMC and IATTC regarding the IDCPA research program

Appendix 4: Peer reviews of studies comprising the IDCPA research program conducted by the CIE

Appendix 5: Abundance estimates for depleted stocks

Appendix 6: Ecosystem studies

Appendix 7: Stress studies and other possible fishery effects

Appendix 8: Quantitative stock assessment of the depleted dolphins